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(54) Method and apparatus for rescuing the crew of a ship or sea-platform

(57) A submersible lifeboat 7 is equipped with ballast means and is situated inside an immersed tunnel 5 provided at the front with an ejectable door 6, and connected via a shaft 7 with the decks 1a—d of the ship or of the platform.

The lifeboat rests on a supporting structure which slides on horizontal rails to come out of the tunnel. The lifeboat is secured to the structure by means permitting to measure the buoyancy which buoyancy can be adjusted by the ballast means. The buoyancy is just positive to enable the lifeboat to track slowly to the surface away from the vessel.

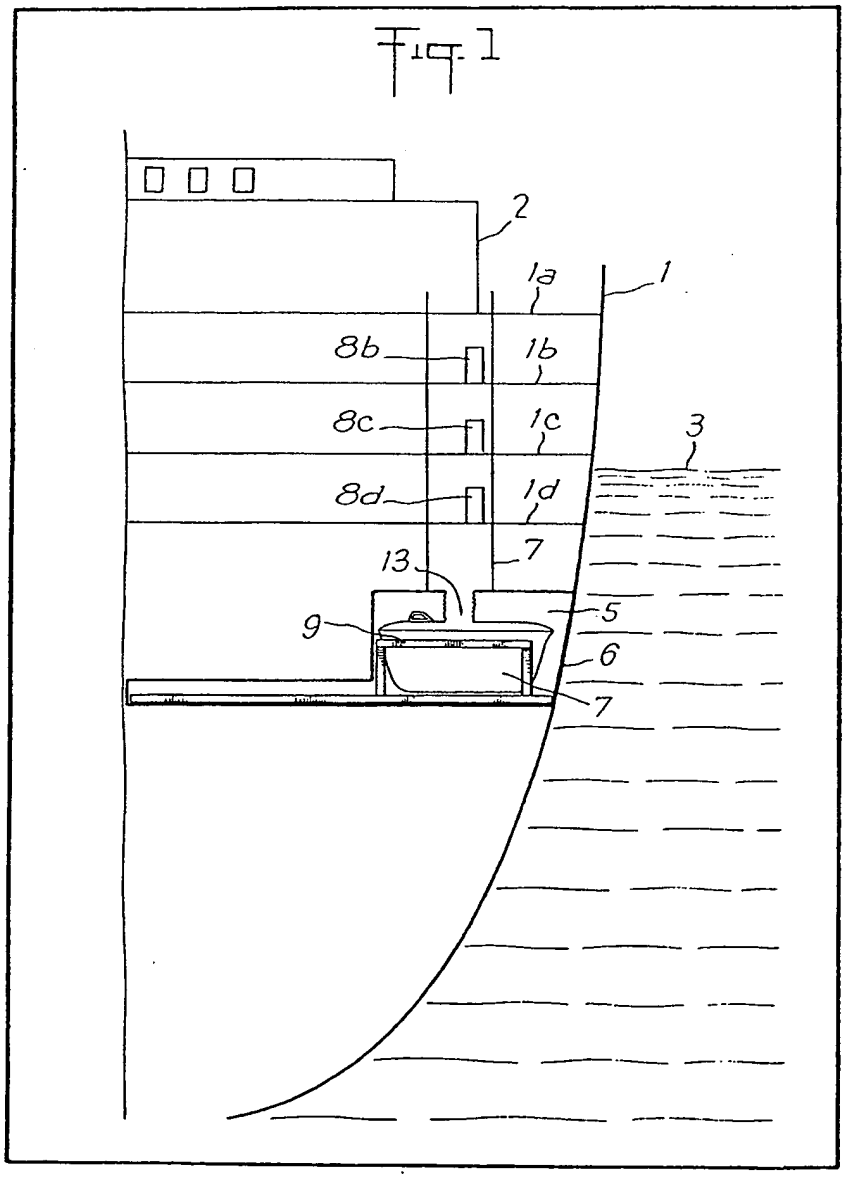

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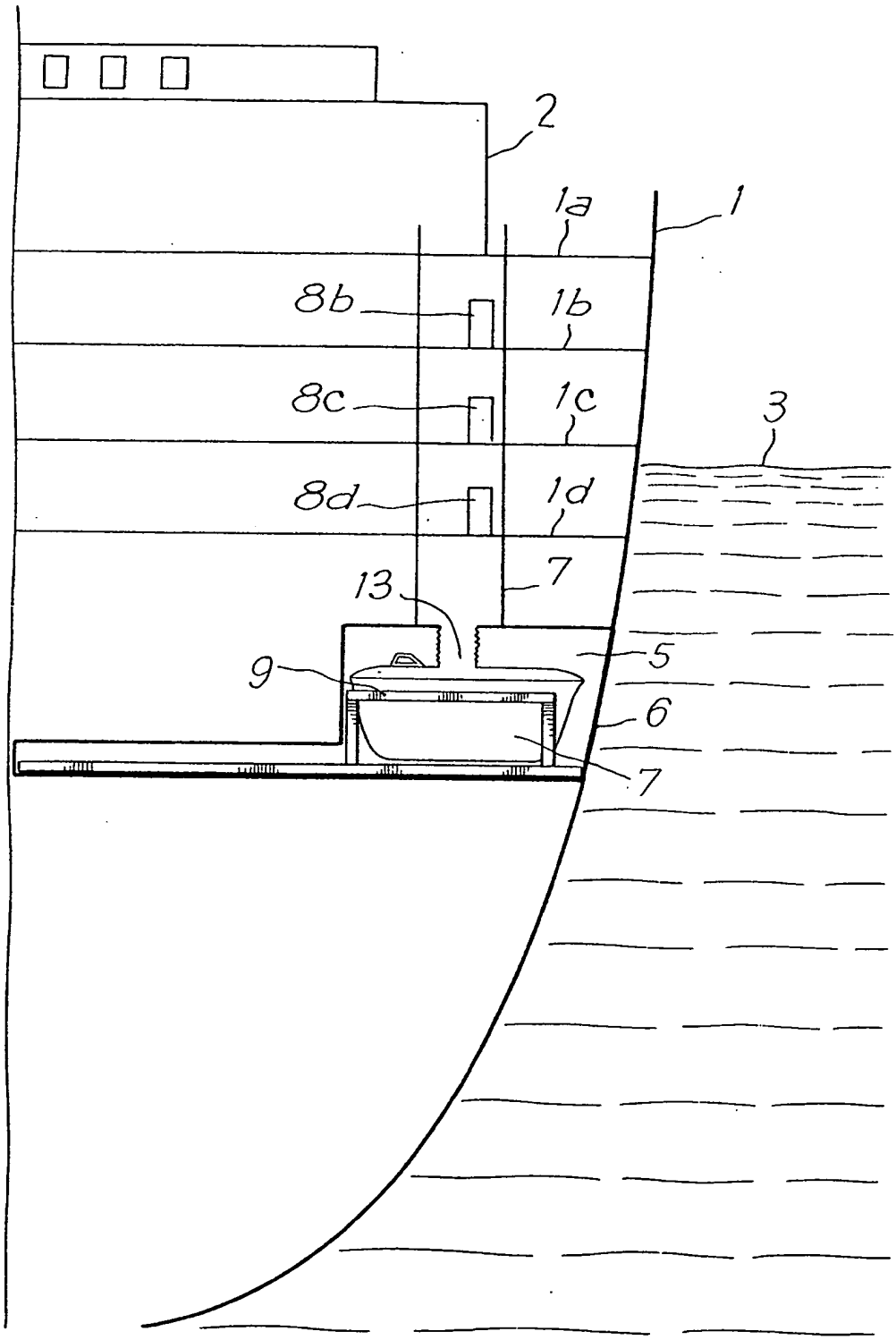
Fig. 1



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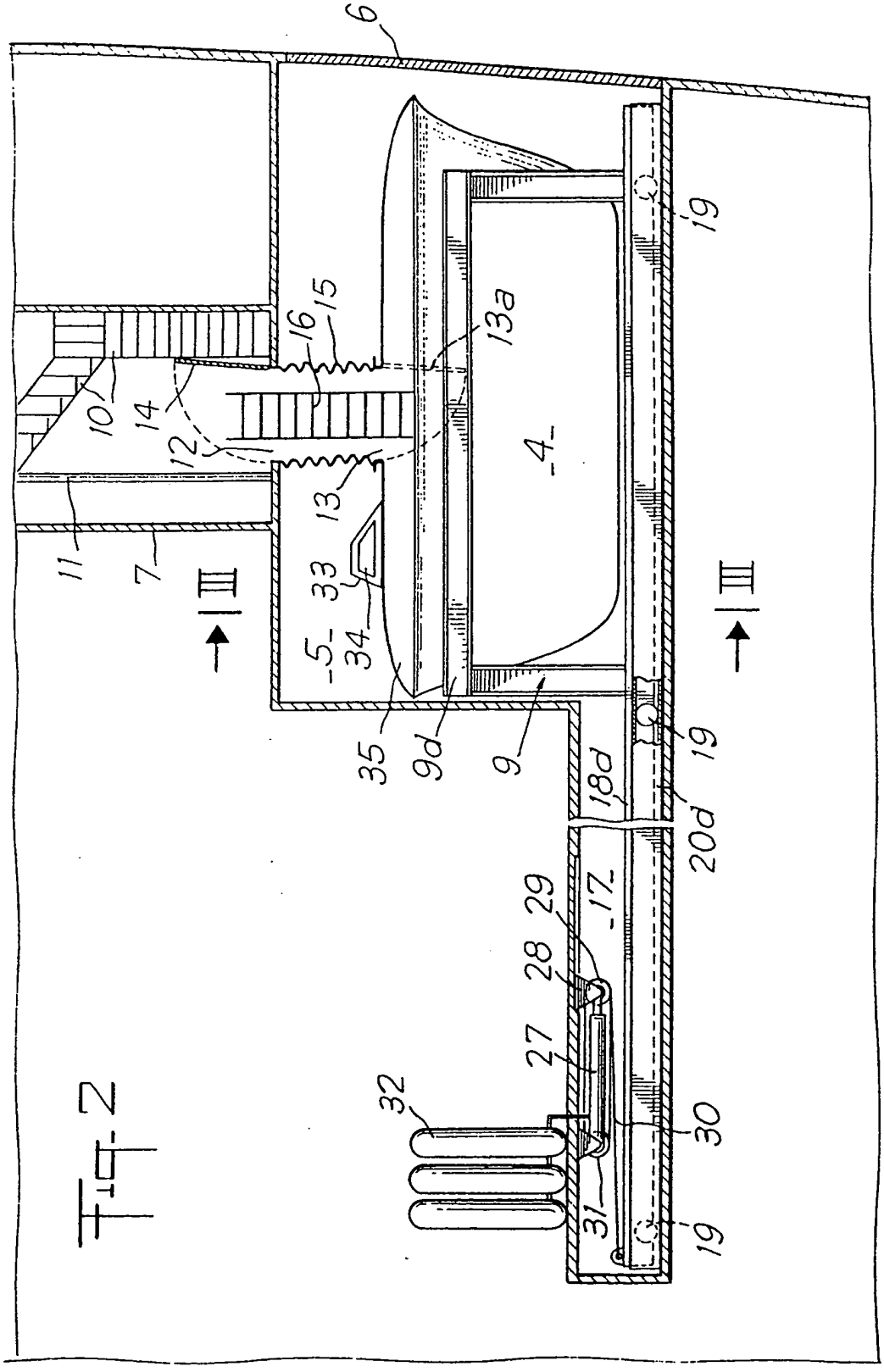


FIG 2

Fig. 3

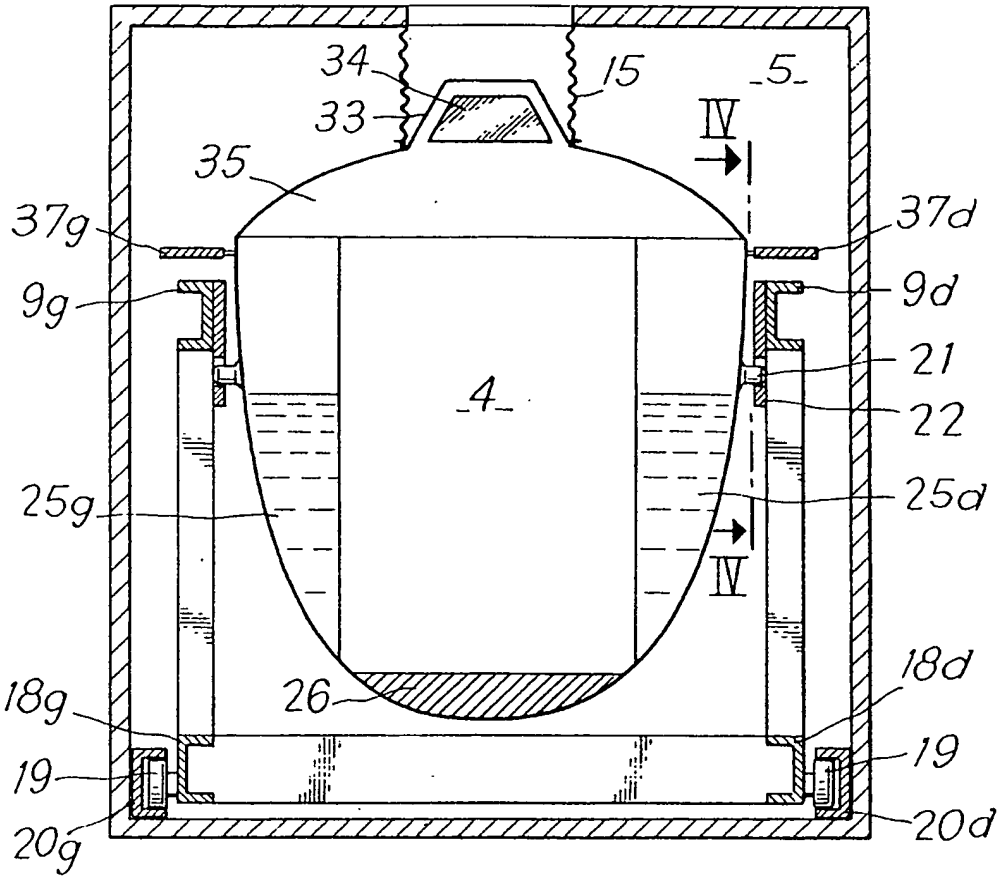
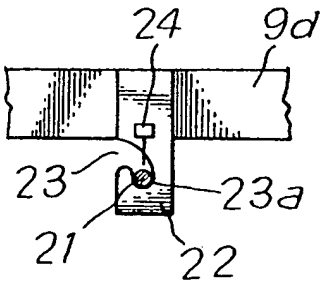

34
33
15
5
IV
35
37g
37d
9g
9d
21
4
22
25g
25d
IV
18g
26
18d
19
19
20g
20d

Fig. 4


24
9d
23
23a
21
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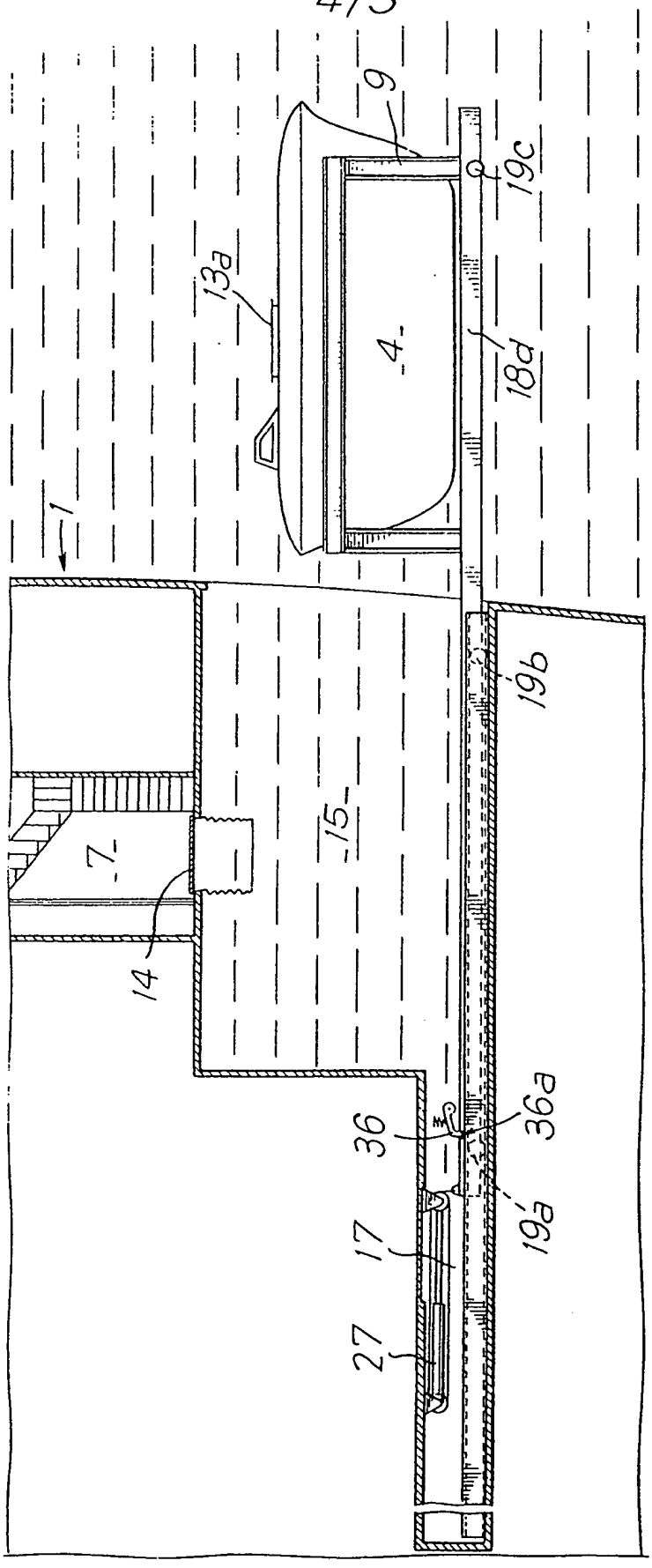
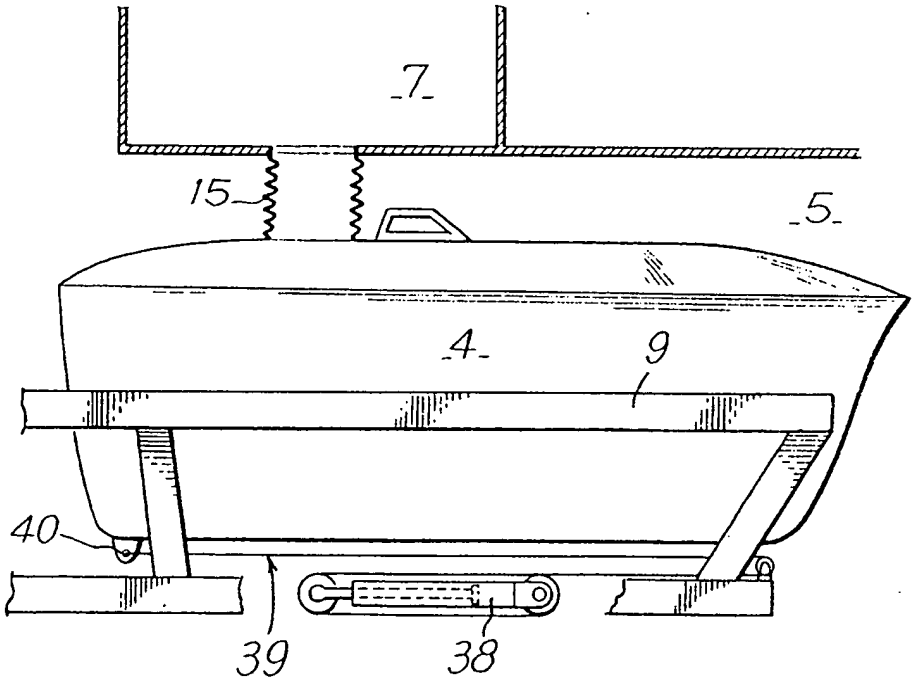


FIG 5

Fig. 6



SPECIFICATION

Method and device for rescuing the crew of a ship or sea platform

The present invention relates to a method and device for rescuing the crew of a sinking ship or sea-platform.

The means normally used to rescue the crew of a sinking ship or the personnel working on a sea-platform are surface crafts or lifeboats which are launched from the ships' decks or from the platform by way to lifting apparatus, the crew going down into the boat.

But the freeboard of large ships, namely the height at which the upper deck rises above the waterline is high, around 10 metres. The same applies to sea-platforms. This making the launching difficult in rough weather and in case of fire.

Also, in may cases, a sinking ship and in particular an oil-tanker, is surrounded by a floating sheet of flames which is due to the oil which has escaped from the ship into the water and has alighted. The same occurs when a fire starts on a sea-platform.

It has been proposed in the case of large ships, to mount the lifeboats on a ramp which is inclinable.

The members of the crew then take their place inside the boats which then slip into the water.

These means however cause a high speed arrival of lifeboats in the sea.

The members of the crew are fastened to the seats by way of safety belts.

French Patent No. 1 299 911 (I. Fleming) describes lifeboats which are equipped with a fireprotecting screen made from a flame-resistant material.

French Patent No. 2 225 965 (Y. Catholan) describes life-saving contrivances shaped as ballast-spheres which are stored on the deck of a ship and are lifted down into the water by way of a winch suspended to a cable which is operated from inside the contrivance.

French Patent No. 989 704 (H. Guttin) describes lifesaving means constituted by tight floating tanks which are placed in semi-immersed tunnels.

U.S. Patent No. 1 721 039 (J. Risher) describes individual cylindrical buoys for rescuing submarine crews.

French Patent No. 741 841 (Glycas) describes life saving means constituted by tight floating cabins which are stored in cells situated above the waterline and are lifted down into the sea.

It is the object of the present invention to overcome the disadvantages of the known lifeboats by proposing means to rescue the crew of a sinking ship or of a sea-platform, and in particular which enable to move away from the ship and to go through wide stretches of flames without risks of burns to the people in the boat.

To solve this problem, it could have been suggested to evacuate the members of the crew in one or more submarines which would leave the ship or platform and stay under water to cross the blazing area.

But such a solution would necessitate to equip the ships and platforms with submarines large enough to contain all the members of crew or personnel, and it would also necessitate the presence of experts capable of steering a submarine.

One object of the present invention is to procure life-saving means comprising a lifeboat which can leave the sinking ship whilst being under water, and slowly comes up to the surface whilst moving away from the ship, but without being a conventional submarine.

The objects of the invention are reached with a method for rescuing the crew of a large ship or sea-platform, which consists in the following operations:—

the crew has access to a submersible lifeboat through a shaft, which lifeboat is equipped with ballast means and rests on a sliding structure inside a tunnel situated under the surface of the water;

the said tunnel is filled with water and the buoyancy of the lifeboat is adjusted to a low positive value;

the tunnel is opened;

and the structure on which rests the lifeboat is caused to slide horizontally in order to bring the said boat out of the tunnel;

then the boat is propelled horizontally to separate it from the structure and goes up towards the surface, following an inclined course which takes it away from the ship or from the structure;

once on the surface, a pilot who is standing inside an emerging dome provided with port-holes, steers the lifeboat away from the ship or from said structure;

and when the boat has left the danger area, the crew empties the ballast-tanks and/or releases the ballast and said boat becomes a lifeboat sailing on the surface.

A rescuing device according to the invention comprises:—

a tunnel situated below the waterline and having at the fore end an opening out to sea which is sealed by an ejectable door;

a shaft which connects the said tunnel with the decks of the ship or platform;

a supporting structure situated inside the tunnel and which is slidable on horizontal rails to come out of the tunnel through said opening;

and a lifeboat which is equipped with an access opening communicating with the base of the shaft, which boat comprises ballast-tanks and is fixed on the supporting structure by means of supports comprising strain-sensors, so that it is possible to adjust the buoyancy of the boat to a low positive value.

The boat in the device according to the invention comprises a tight cover topped with a dome provided with port-holes and a hatchway closed by a water-tight door, and the cover, dome, port-holes and water-tight door are all built

in materials which can withstand blazing temperatures.

The invention procures a new means to evacuate the crew or personnel from a sinking ship or from a platform floating on a stretch of water.

In the case of a crew having to abandon a sinking ship or platform surrounded by stretches of burning hydrocarbides, the devices according to the invention have the advantage that the crew can reach the lifeboats through internal shafts which are sheltered from the flames, and that the boats, being under water, can leave the ship and cross the blazing stretches without risk for the crew members on board.

Moreover, compared with the currently known rescue systems wherein the lifeboats are stored on the upper decks of the ships and have to be lifted down into the sea by way of lifting apparatus or ramps, the devices according to the invention eliminate time-consuming handling operations and prevent the lifting down of the boats and crew along the sides of the ship which sides could also be ablaze, or surrounded by flames.

Due to the strain-sensors placed on the connection between the boat and the supporting structure, it is possible to regulate accurately the buoyancy of the boat to a very low positive value, around several hundreds of kilos, so that only a dome or a shaft with port-holes emerges when the boat comes up to the surface, and so that said boat can steer away from the sinking ship and cross stretches of flames without any danger for the people on board.

The fact that the lifeboat rests on a sliding structure and that it comes out of the ship, whilst still on said structure, which is guided on rails, has the advantage to prevent any risk of the lifeboat, which has a positive buoyancy, heeling over and remaining stuck inside the tunnel.

Although a lifeboat according to the invention is designed to sail under water when leaving the sinking ship, it is required to sail only about ten metres under water, therefore under a low hydrostatic pressure which does not make it necessary for the hull to be thickly constructed in order to withstand high pressures.

Provided that the ballast-tanks are empty initially to ensure a positive buoyancy in full load, even if the buoyancy adjusting system and the lifeboat propellers break down, it suffices that the system provided to eject the sliding structre out of the tunnel and that provided to thrust the lifeboat horizontally out of the sliding structure, operate for the lifeboat to come up to the surface due to its buoyancy.

The devices for ejecting the sliding structure and thrusting the lifeboat horizontally can be duplicated in order to ensure reliability.

The invention will be more readily understood on reading the following description, with reference to the accompanying drawings, in which:

Figure 1 is a view showing half a cross-section of a large ship equipped with a rescuing device according to the invention.

Figure 2 is a vertical section of the tunnel containing the lifeboat.

Figure 3 is a cross-section along line III—III of Figure 2.

Figure 4 is a partial section along line IV—IV of Figure 3.

Figure 5 is an elevational view of the lifeboat resting on the supporting structure after said structure has slid out of the tunnel;

Figure 6 is an elevational view of the lifeboat resting on the supporting structure.

Referring first to Figure 1, this shows a cross-sectional view of one half of a heavy tonnage ship, such as an oil tanker, which comprises several superimposed decks 1a, 1b, 1c, 1d and a superstructure 2.

The reference 3 designates the surface of the sea. The ship 1 is equipped with a rescuiing device, in case the crew should have to abandon ship.

Said rescuing device is composed of a craft or lifeboat 4 which is enclosed in a tunnel 5 situated well below the waterline in all cases of ship-load.

The entrance to the tunnel 5 is sealed by an ejector door 6.

Said tunnel 5 communicates with an evacuation shaft 7 traversing all the intermediate decks and issuing on the upper deck. The shaft 7 comprises water-tight doors 8b, 8c, 8d at the level of every intermediate deck. The lifeboat 4 is fixed on a structure 9 which is slidable on horizontal rails.

Figure 2 shows on a larger scale, a vertical section of the tunnel 5 and of the boat 4 placed inside said tunnel. Said Figure shows the lower end of the shaft 7 which is for example equipped with stairs 10 and climbing bars 11 permitting a rapid descent in cases of emergency. The lower end of the shaft 7 comprises an opening 12 situated above the opening 13 giving access into the lifeboat. Said opening 13 is equipped with a water-tight door 13a. The opening 12 is normally sealed by a water-tight door 14. Watertight bellows 15, in rubber for example connect the opening 12 to the opening 13.

After opening the door 14, a short ladder 16 placed inside the bellows 15 allows the crew members to pass from the shaft into the lifeboat.

As can be seen in Figure 2, the tunnel 5 is extended at the back by a smaller tunnel 17 the length of which is substantially equal to that of tunnel 5.

The lifeboat 4 is supported by a structure 9 composed of two gantries 9g, 9d situated on either sides of the lifeboat. Each one of said gantries 9g, 9d rests on a horizontal beam, 18g, 18d respectively, which extends rearwards into the tunnel 17. The beams 18g, 18d are equipped with runners 19 which run over lateral rails 20g, 20d secured to the side walls of the tunnels 5 and 17.

Figure 3 is a cross-section of the tunnel 5 and illustrates one embodiment of the gantries 9g, 9d

and of the beams 18g, 18d equipped with the runners 19 which run on the rails 20d, 20g which are sectional shapes fixed along the side walls of the tunnels 5 and 17.

The sectional shapes are U or I shaped sections and the runners run between the flanges so as to prevent the structure from tipping over when part of it is console-shaped.

According to the embodiment shown in Figure 3, the lifeboat 4 comprises axle ends 21 which project from its sides and engage into notches cut into support plates 22 fixed on the structure 9.

Figure 4 is a cross-section along line IV—IV of a support plate 22 comprising a notch 23 into which is engaged a shaft end 21. According to said figure, the notches 23 are open towards the front and each one is provided at the back with a vertical recess into which rests the axle ends 21 when the byoyancy of the lifeboat is negative. In that position, the axle ends 21 cannot come out of the notches 23 and the life-boat cannot leave the structure 9. When the buoyancy of the boat is positive, the axle ends 21 rise up in the notches 23 and can come out through the openings thereof. The notches 23 can be equipped with end-of-course contacts 24, such as micro-switches, which come in resting contact with the axle ends 21 when the buoyancy becomes positive.

Figures 3 and 4 illustrate a special embodiment of the connection between the structure 9 and the lifeboat 4. Other equivalent types of connections can also be used, which are equipped with strain-sensors, such as for example strain gauges, measuring the direction and intensity of the stresses exerted by the lifeboat on the structure. Said sensors give the crew an indication of the buoyancy of the craft and enable them to alter that buoyancy.

According to the cross-section illustrated in Figure 3, the lifeboat 4 comprises lateral ballast-tanks 25g, 25d, which enable to vary the buoyancy of the boat. Said boat 4 also comprises ballasts 26, such as pigs for example which can be released and also enable to modify the buoyancy.

Figure 2 illustrates an embodiment of them means used to push the structure 9 supporting the lifeboat 4 out of the tunnel, by running it along rails 20g and 20d. These means comprise one or two jacks 27 which moves a slide-block 28 carrying a pulley 29 over which passes a cable 30 which is fixed to the rear end of the structure 19. The cable is reeved on a second return pulley 31. The jacks 27 are fed with pressurized oil from oil and air accumulators 32 situated in the ship 1. Obviously, the means described for pushing the structure can be replaced by any other equivalent means.

The stroke of the jack 27 and the number of lines of the reeving are calculated so that when the slide-block 28 reaches the end of a stroke, the lifeboat 4 is entirely out of the tunnel 5.

Figure 5 shows the lifeboat 4 supported by the structure, in the position where the lifeboat is out of the enclosure 15. In this position, the part of the structure 9 which supports the boat 4 is clearly console-shaped, but the rear portion of the beams 18 remain guided by two pairs of runners 19a, 19b, so that the structure 9 remains horizontal and that the boat 4 is likewise held in a substantially horizontal position.

The device and lifeboat according to the invention work as explained hereunder.

In the case of serious damage, resulting in the crew having to abandon ship, the members of the crew situated on the different decks of the ship reach the evacuation shaft 7 either by the upper end, or by the access doors 8 situated on every intermediate decks. Once at the bottom of the shaft, they get immediately into the lifeboat.

When the lifeboat is full, the crew members take away the short ladder 16 and close the hatchway 14 which seals off the lower end of the shaft 7 in order to avoid any water leaks.

Indeed, the same ship can be equipped with more than one evacuation shafts and lifeboats and all the lifeboat ejection operations should be independent one from the other.

The crew members then close the hatchway 13a which seals off the opening 13 giving access into the lifeboat. Then the crew members control the filling up of the tunnel 5 with water in order to remove the difference of pressure between the two faces of the door 6.

This filling up is conducted for example through filling gates situated in the door 6, and the opening of which is controlled from the lifeboat.

As a variant, the tunnel 5 can be kept constantly full of water up to a level just below the level of the opening 13 in order to spare the time needed to fill the tunnel 5.

In this case, the bellows 15 prevent the water from entering into the lifeboat through the opening 13. Once the tunnel 15 is entirely flooded, the door 6 is ejected from the lifeboat.

Once the lifeboat is completely immersed, the crew adjust the buoyancy from the indications of the strain gauges situated on the connections between the boat 4 and the supporting structure 9. The adjustment of the buoyancy is essential. Obviously, the lifeboat should have a positive buoyancy to prevent it from sinking when it leaves the tunnel 5.

Safety means prevent the boat from leaving the tunnel whilst the buoyancy is negative.

Figure 4 shows a very simple embodiment of such safety means which are obtained with notches 23 provided at their rear lower part with a groove 23a in which is engaged an axle end, so that said axle end 21 cannot come out of the notch whilst the buoyancy is negative.

The buoyancy of the lifeboat should not be too positive either, in order to avoid that said boat comes up to the surface too fast, and too high above the waterline.

The object of the invention is to propose a lifeboat which is capable of leaving the ship 1 under water, but which is not designed as a submarine, with all the problems that this would

entail construction-wise and utilization-wise.

However, whenever a large ship such as an oil-tanker or a war-ship suffers important damages, the ship is frequently surrounded by flames, and it is necessary for the crew members which have taken place in the lifeboats to be protected from these flames. To this effect, the invention uses a low positive buoyancy of the lifeboat, around a few kilogrammes only. When the lifeboat leaves the supporting structure 9 it is subjected both to a horizontal propelling force, and to the vertical pressure of the water. If this is low, the resultant is substantially horizontal and the lifeboat moves away from the ship along a rising course which causes it to emerge at some distance from said ship.

Also, when it surfaces, and because of the low buoyancy, only a dome 33, equipped with portholes 34, emerges from the water to allow the pilot to see where he is and to steer the boat away from the sinking ship.

Said dome 33 and portholes 34 ard made from a flame-resistant material. The top part of the lifeboat is covered with a metallic deck 35 which is also flame-resistant.

Reverting now to the other operations carried out by the crew, the crew members have therefore adjusted the buoyancy of the craft to a low positive value.

The lifeboat 4 is connected to the supporting structure 9 by connecting devices comprising strain gauges situated at the front and at the back and the crew, at the same time, adjust the trim of the boat to keep it substantially horizontal.

To save time, the ballast-tanks 25g, 25d can be already partly filled to ensure a low positive buoyancy for when the boat is full.

If the boat is not full, the byoyancy then will be too strong, and it will suffice to let a little more water into the ballast-tanks 25g and 25d or to release the pigs. These adjustments can be effected by hand or automatically.

It will be noted that the connection between the lifeboat and the shaft by a flexible bellows 15 cannot cause any errors when measuring the buoyancy of the boat because of the longitudinal deformation possibilities of the bellows.

Once the buoyancy has been adjusted, the crew controls the ejection of the supporting structure 9 using for example a jack 27 which pushes the structure to the position illustrated in Figure 5, the lifeboat being still on the structure, this avoiding the risk of the boat heeling over and remaining stuck in the tunnel 15. Under the stroke of the jack, the bellows 15 which connected the lifeboat to the base of the shaft is pulled off.

When the supporting structure 9 has reached the end of its course a mechanical locking immobilizes it in that position.

Said mechanical locking is constituted for example by a ratchet-spring 36 engaging into notches 36a of the structure or any other equivalent locking means.

Once the supporting structure has been locked in its end-of-course position, the crew can control the departure of the boat.

The lifeboat is equipped to this effect with a screw propeller which is driven by an electric motor running on batteries.

The horizontal thrust of the propeller separates the lifeboat from the structure.

To speed up these separation operations and to increase the horizontal acceleration at the start, the supporting structure 9 can be equipped with lifeboat thrusting means.

Figure 6 shows an example in which the structure 9 is equipped with a jack 38, similar to the jack 27, which is fixed on the structure beneath the boat and which pulls a reeved cable 38 attached at the stern 40 of the boat. This jack can be fed with compressed oil from air and oil tanks 32 connected therewith via a flexible pipe which unwinds when the supporting structures come out of the tunnel. It is also possible to use the energy stored in the springs resting against the structure 9 and which thrust the boat 4 horizontally.

Said boat 4 advantageously comprises hydroplanes 37g, 37d, i.e. rudders mounted for pivoting about a horizontal axis which enables to control the surfacing of the boat.

Once on the surface, only the dome 33, the access opening 13 and optionally the top of the deck 35 emerge. The pilot, who is inside the dome 33 moves the helm to steer the lifeboat away from the sinking ship 1.

The reserve energy of the lifeboat enables to supply the propeller for long enough to move the boat a few kilometers away from the sinking ship. The boat 4 can move safely across any blazing stretches which could surround the ship 1.

Once out of the danger area, the crew then empty the ballast-tanks 25g, 25d and release the pigs 26. The buoyancy of the boat 4 then becomes that of a surface craft. A large part of it emerges and the crew can then safely open the hatchway 13 to let in the air and sends S.O.S. messages by radio, or by flares, etc....

The boat 4 is large enough to allow the people on board to breathe safely through the whole period when the boat is sealed, which is a relatively short period. But for more safety, the boat 4 can be equipped with reserve oxygen and a carbon dioxide absorbing device.

The foregoing description concerns devices for rescuing the crew of a ship. But this application is not restrictive, and the devices according to the invention could also be installed on fixed or floating sea platforms, to allow the emergency evacuation of personnel in cases of fire whilst avoiding all risks of burns through such evacuation.

Obviously, the lifeboats according to the invention contain all the survival material which normally equips lifeboats.

The figures illustrate a lifeboat which comprises a hatchway 13 and a dome 33, both separate one from the other, but of course, the

hatchway could be situated at the top of the dome 33.

Claims

1. Method for rescuing the crew of a ship or sea-platform, wherein:—

the crew has access to a submersible lifeboat through a shaft, which lifeboat is equipped with ballast means and rests on a sliding structure inside a tunnel situated under the surface of the water;

the said tunnel is filled with water and the buoyancy of the lifeboat is adjusted to a low positive value;

the tunnel is opened;

and the structure on which rests the lifeboat is caused to slide horizontally in order to bring the said boat out of the tunnel;

then the boat is propelled horizontally to separate it from the structure and goes up towards the surface, following an inclined course which takes it away from the ship or from the structure;

once on the surface, a pilot who is standing inside an emerging dome provided with portholes, steers the lifeboat away from the ship or from the structure;

and when the boat has left the danger area, the crew empties the ballast-tanks and/or releases the ballast and said boat becomes a lifeboat sailing on the surface.

2. Method according to claim 1, wherein said boat is propelled out of said supporting structure by the boat propellers and optionally by thrusting means mounted on said structure.

3. Device for rescuing the crew of a ship or sea-platform, wherein said device comprises:—

a tunnel situated below the waterline and having at the fore end an opening out to sea which is sealed by an ejectable door;

a shaft which connects the said tunnel with the decks of the ship or platform;

a supporting structure situated inside the tunnel and which is slidable on horizontal rails to come out of the tunnel through said opening;

and a submersible and self-propelled lifeboat which is equipped with an access opening communicating with the base of the shaft, which boat comprises ballast-tanks and is fixed on the supporting structure by means of supports comprising strain-sensors, so that it is possible to adjust the buoyancy of the boat to a low positive value.

4. Device as claimed in claim 3, wherein said shaft is equipped with steps and/or vertical bars along which the crew members can slide down, said shaft being closed at the bottom by a water-tight door.

5. Device as claimed in claim 4, wherein said tunnel comprises a rearward extension, the length of which is substantially equal to that of the said boat, the said rails and the beams from the supporting structure extending inside the said extension.

6. Device as claimed in claim 5, wherein means are provided to push said structure and the boat mounted thereon out of the tunnel.

7. Device as claimed in claim 6, wherein said means are constituted by at least one jack situated inside said extension, which jack pulls on a cable attached to the rear end of said supporting structure and by air and oil tanks situated on board the ship and supplying said jacks.

8. Device as claimed in claim 3, wherein the connection between the boat and the supporting structure comprises means which prevent said boat from leaving said structure whilst the buoyancy of the boat is negative.

9. Device as claimed in claim 8, wherein the said boat comprises lateral axle ends which are engaged in notches open towards the front and provided at the back with a groove in which one of the said axle ends is engaged and is locked in engagement as long as the buoyancy is negative, each groove comprising an end-of-course sensor against which abuts the said axle end and which indicates when the buoyancy is positive.

10. Device according to claim 3, wherein said supporting structure comprises means to push the said boat horizontally out of the supporting structure.

11. Device according to claim 3, wherein the said lifeboat comprises a water-tight cover which is topped by a dome provided with port-holes and a hatchway closed by a water-tight door, and said cover, dome, port-holes and door are constructed from materials able to withstand blazing temperatures.

12. Device according to claim 10, wherein the said lifeboat comprises hydroplanes mounted for pivoting about a horizontal axis.

13. Device substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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